

Amendment and Response

Applicant: Christopher A. Merton

Serial No.: 10/822,885

Filed: April 13, 2004

Docket No.: 10408S01

Title: MAGNETIC RECORDING MEDIUM HAVING A SMOOTH BIAXIALLY TENSILIZED FILM
SUBSTRATE

REMARKS

This Amendment is responsive to the Office Action mailed March 25, 2005, in which claims 1-11 were rejected. With this Response, claims 1, 3, 10, and 11 have been amended. New claim 12 has been added. Original claims 2 and 4-9 remain pending in the application and are presented for reconsideration and allowance.

Claim Rejections under 35 U.S.C. § 112

Claims 2, 10 and 11 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, the Examiner has rejected claim 2, stating that in the coefficient of thermal expansion, expressed as "ppm/C", there is no indication that per degree centigrade is mean. Applicant respectfully disagrees. The definition of a coefficient of thermal expansion (CTE) is the ratio of the change in a material per unit of temperature change. Therefore, the denominator in the units must represent a unit of temperature. There are only three possible units of temperature: Fahrenheit, Centigrade, and Kelvin, each of which is commonly abbreviated by its first letter, so the use of "C" cannot be mistaken for another scale. The centigrade temperature scale, as are all temperatures scales, is measured in degrees, and is the most commonly-used temperature scale. The centigrade scale and unit is almost universally used in industrial measurements. One skilled in the art would be reasonably apprised of the meaning of the unit. Further, common nomenclature for such measurements does not represent the degree sign in such a unit because it is known. This is true, whether degrees centigrade or degrees Kelvin are used. Many reference materials refer to the scale by its first letter only without more in this context.

Applicant would also note that Tsukuda, the reference to which the Examiner has cited, does not apply any units whatsoever, in its paragraph regarding coefficient of thermal expansion [0019], simply a range of -1×10^{-5} to 4.0×10^{-5} and yet the Examiner has decided that this is clear enough to contend that the medium should have a CTE in the ranges taught by Applicant.

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While Applicant will argue that some units should be required so that the length or volume used to measure the CTE is known, the Examiner considers himself to be apprised of the meaning of this range. Applicant submits that by the same logic, the unit of ppm/C supplies all the relevant information to one skilled in the art.

Finally, Applicant points out that Section 112, paragraph 2, requires that the claims have a "reasonable degree of precision." Applicant believes this standard is met by claim 2 as one skilled in the art would be able to read the unit "ppm/C" as meaning "parts per million per degree Centigrade" without hesitation. Just as the Examiner was fully aware of what the "C" in the unit represented, so would one skilled in the art.

The Examiner has rejected claims 10 and 11 for the terms "large" and "primary." Applicant would note that the Examiner states that one skilled in the art would not be reasonably apprised of the meaning of the word "large" as applied to carbon particles. Applicant respectfully disagrees. In the specification at page 8, lines 24-28, Applicant has defined the particle size of such large particle carbon material. However, to further the prosecution, Applicant has placed such definition of the size, i.e., from about 50 to about 500 nm, in the claims. Applicant has removed the term "primary" from the claims.

In view of the above, Applicant respectfully requests that the Examiner remove the rejections under 35 U.S.C. §112, second paragraph.

Claim Rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103

Claims 1 and 3-8 are rejected under 35 U.S.C. §102(b) as being anticipated by Tsukuda et al. (EP 1044788). Applicant respectfully traverses the rejection for the claims as currently pending.

Claims 2 and 9 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tsukuda et al. (EP 1044788) as applied to claim 1.

Claims 2, 9-11 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tsukuda et al. (EP 1044788) in view of Yamaguchi et al. (U.S. Patent No. 4,420,532).

Applicant respectfully traverses the rejections for the claims as currently pending.

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First, Applicant disagrees with the Examiner's apparent decision in paragraph 4 of the Official Action not to give any weight to the limitations in claims 1, 3 and 4 relating to the properties of the magnetic recording tape as they compare to properties of a recording head. A magnetic recording tape such as those tapes claimed by Applicant is used with a magnetic recording head. Without such a head and magnetic recording apparatus, the magnetic recording tape cannot be recorded upon. Applicant has discovered that a magnetic recording tape having more stable recording properties may be made by equalizing certain physical properties such as thermal and hygroscopic expansion of the magnetic recording tape to similar physical properties present in the magnetic recording head. Equalizing those properties means that the magnetic recording medium and the magnetic recording head expand in a relatively equal fashion under temperature and humidity changes, and thus keep the relative change very small. Neither of the references discloses, teaches or suggests that such equalization is possible or that designing a magnetic recording tape with properties similar to that of magnetic recording heads can provide benefits to a magnetic recording tape. Applicant, therefore, believes that if such claim limitations were considered, that Applicant's claims would not be anticipated nor rendered unpatentable by the references. Applicant, therefore, respectfully requests that the Examiner consider these limitations in examination of the claims.

Alternatively, Applicant has presented new claim 12, which relates the properties of the magnetic recording tape to the properties of the material of which the industry standard magnetic recording head is formed. Again, none of the references disclose, teach or suggest that formation of a magnetic recording tape where the finished tape has physical limits which are closely equalized with physical properties of a specified material is desirable or would have any benefits. Applicant requests consideration and allowance of new claim 12.

Specifically, Tsukuda does not disclose, teach or suggest that the crossweb dimensional difference of a magnetic recording medium should be within 900 microns/meter of the dimensional difference of the crossweb direction of the magnetic recording head that is impinging on the crossweb direction of the tape. Tsukuda does not disclose, teach or suggest any relationship between crossweb dimensional changes of the magnetic recording medium and the

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magnetic recording head. Tsukuda does not recognize that matching dimensional differences in the crossweb direction is desirable, but rather creates a polymer substrate having certain specific properties and does not disclose properties of the magnetic recording medium nor recognize the problem that if the magnetic recording head has different dimensional properties, the quality of recording magnetic recording medium will not be stable but will be dependent on the temperature and humidity conditions. If the properties are well matched and the two change dimensions in the same fashion, i.e., expand in the same or similar ratios when subjected to changes in temperature and humidity, the magnetic recording medium will have more stable recording qualities.

As noted above, the Examiner has stated that the coefficient of thermal expansion of the film is the same in Tsukuda as in Applicant's claims and points to paragraph [0019]. First, Applicant notes that Tsukuda provides no units whatsoever for the coefficient of thermal expansion in that paragraph. Only a range of -1×10^{-5} to 4.0×10^{-5} is stated. It is not known what volume measurement is used. However, if one assumes the measurements are similar, then the equivalent range expressed in the same units would be -10 to 40 ppm/C. The Examiner has stated that because Tsukuda teaches that the medium should be in this range, it is obvious to one of ordinary skill in the art to regulate within the range. Applicant respectfully disagrees. Tsukuda provides no motivation to select the portion of the range which would be close to the coefficient of thermal expansion of the magnetic recording head. Tsukuda teaches ranges of acceptable expansion in the substrate but the range includes expansions which may be vastly different from the changes undergone by a magnetic recording head. Without a motivation to equalize those forces, created by discovery of the relationship between the magnetic recording medium properties and those of the magnetic recording head, the reference teaches nothing about what range inside the broad range would be desirable.

Also, Tsukuda's range applies to the polymer film, or substrate, itself, as do all the properties in Tsukuda, and not to the final tape. Coating of one or more layers of pigments, binders, and the like, changes the properties. No physical properties for the final magnetic recording medium are given, only those for the substrate. Applicant cannot agree that the

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teachings of Tsukuda on the properties of the substrate render it obvious to one skilled in the art that the properties of modulus, CTE, and coefficient of hygroscopic expansion for a composite magnetic recording tape should be selected for to be close to, or equal to, the similar physical properties of a magnetic recording head, or to the Al_2O_3 -TiC bi-phase ceramic formed from aluminum oxide and titanium carbide of which such a head is made. Applicant would point to the table on page 17 of the above-cited application, which shows that the biaxially tensioned thermal substrate has a transverse or crossweb coefficient of thermal expansion of 2.0, while the CTE of the tape is 7.2, more than three times that of the substrate, but a difference of only 0.2 from that of the magnetic recording head. In this specific example, a substrate having a CTE of 40 would be within the range taught by Tsukuda, and would result in a magnetic recording tape with an extremely high CTE relative to the recording head. This tape would have a CTE many times the CTE of the magnetic recording head and would not be within the range taught by Applicant. Such a difference would reduce the recording performance under conditions of increased humidity or temperature.

Further, the range of Tsukuda includes -10 to 0, which would be a contraction of the tape rather than an expansion. Modern magnetic recording heads of today expand rather than contract upon increases in temperature and humidity. A magnetic recording medium that contracts when exposed to common temperature and humidity changes would increase the relative differences between the medium and the recording head and reduce performance.

Applicant, therefore, believes that Tsukuda does not anticipate nor render unpatentable Applicant's claims.

Yamaguchi does not teach or suggest anything about substrate or magnetic recording medium dimensional stability nor does it teach anything about the importance of matching properties of a magnetic recording medium to a magnetic recording head for performance stability under varying temperature and humidity conditions. Therefore, the combination of Tsukuda and Yamaguchi do not teach or suggest that it is desirable to equalize, or match properties of a magnetic recording medium to a magnetic recording head for performance stability.

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For these reasons, Applicant respectfully requests that the rejections under 35 U.S.C. § 102 and U.S.C. § 103, over Tsukuda and the combination of Tsukuda and Yamaguchi be withdrawn.

Allowable Subject Matter

In light of the above, Applicant believes the independent claims, and the claims depending therefrom, are in condition for allowance. Allowance of these claims is respectfully requested.

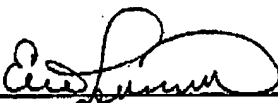
CONCLUSION

Applicant believes that all claims are now in condition for allowance. Early and favorable consideration is requested. Any inquiry regarding this Amendment and Response should be directed to Eric D. Levinson, Telephone No. (651) 704-3604, Facsimile No. (651) 704-5951. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,

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